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IRON AGE

MANUFACTURING MANAGEMENT

WINDS OF CHANGE SWEEP THE BIG THREE AUTOMAKERS

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IRON AGE
MANUFACTURING MANAGEMENT

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ONE OF THE ABC PUBLISHING COMPANIES

WINDS OF CHANGE SWEEP THE BIG THREE AUTO MAKERS

GM, Ford and Chrysler are working to develop innovative, entrepreneurial cultures that can respond quickly to changes in the market.

BY BRYAN H. BERRY

America's Big 3 automakers are redesigning their corporate cultures. The goal of the more streamlined organizations is to develop innovative, entrepreneurial cultures quick to respond to changes in the market. Such cultural revolutions are essential for General Motors, Ford, and Chrysler to remain world-competitive.

The auto industry's large size and past success have encouraged inertia. General Motors, the largest U.S. manufacturing company in any industry, has 750,000 total employees. Getting three-quarters of a million people to aim at the same targets at the same time is difficult, perhaps impossible.

In the past, General Motors executives felt that any automotive technology worth looking at already had to be somewhere in GM. Now that inward-looking self-centeredness has given way to a new enthusiasm about looking outside the corporation for technology or processes that can be transferred into GM.

In January 1984 General Motors began the reorganization of the corporation into two car groups, Chevrolet-Pontiac-Canada (C-P-C) and Buick-Oldsmobile-Cadillac (B-O-C). This effectively transferred power within GM to the two new car groups—and away from the old car and component divisions.

Before 1984, work on a vehicle was split up between the different car and component divisions. Hydramatic, for example, did the transmission, Fisher Body the body, Chevrolet the engine, and the Assembly Division the actual assembly of the car. Now, however, product development teams (PDTs) in the new car groups gather design and manufacturing engineers, purchasing agents, and GM and outside suppliers into groups that develop each major car part from start to finish. Fifty to sixty PDTs are assigned to each major new vehicle. The old car divisions now handle primarily just marketing and sales.

The man at the center of the reorganized GM is Lloyd E. Reuss, the vice president and group executive of the C-P-C group. C-P-C's ambitious goal is to increase GM's penetration into the entry-level and under-35-year-old markets. That market segment—largely subcompact and compact cars—is where the imports have been most successful so far. Stiff competition has forced bigger changes at C-P-C than at B-O-C.

Product Development Teams

The two great virtues of the new PDTs are:

—Experts from the different disciplines work together to plan the project from the beginning, and

—Responsibility for making decisions now rests much lower in the organization than before.

In the old organizations, a design engineer would design an engine part, for example. His design would be passed up through three or four levels in the design hierarchy. Then the design would be passed—with modifications, usually—to manufacturing and purchasing, where the same game of passing the blueprint up the organizational chart would be played. Too often the managers at each level would go over the original design engineer's work, check all the calculations, add a few touches—and then take credit for the work. That's a surefire way to kill young engineers' interest in creativity and innovation.

The advantage of GM's old approach was that so many people looked at each design that many potential problems could be spotted before production. The great disadvantage was that it produced some unwieldy compromises for which no one had to take responsibility.

Before 1984, the first time all the designs of the car and component divisions came together for an overall review was, incredibly, at the desk of the GM president. Now the work of the 50 or 60 PDTs is reviewed by the program manager. At C-P-C the program managers, who have responsibility for the program, report directly to Mr. Reuss. Mr. Reuss reports to Alexander A. Cunningham, executive vice president of GM's North American Automotive Operations. He, in turn, reports to GM President F. James McDonald. Besides giving monthly reports of the PDTs' work to Mr. Reuss, the program managers also make quarterly reports to Mr. McDonald.

Each PDT has been assigned targets for piece-cost, investment, and quality. As the program manager assesses the work of the PDTs, and then Mr. Reuss, Mr. Cunningham, and Mr. McDonald assess the program manager's program, they look at the overall program, not at specific sourcing or design decisions.

Another big problem with GM's old organization was interdivisional rivalry. Each division wanted to do the most work and receive the most credit for new projects. Now people from those old divisions work together on the PDTs.

Before 1984, GM's component divisions were the source of most of the corporation's profits.

The car divisions felt duty-bound to buy, for example, transmissions from Hydramatic; and Hydramatic, to buy castings from Central Foundry. The car divisions sometimes would pay these component divisions higher prices than they would outside suppliers—and sometimes would accept lower quality.

"That was wrong," said David E. Cole, director of the Office for the Study of Automotive Transportation at the University of Michigan. "That system distorted the objectives of the corporation away from where they should have been. The real profit centers should be where the highest value is added to the product: the finished vehicles."

That old buddy-buddy system of purchasing parts from GM divisions is breaking down. The PDTs are willing to buy parts from outside vendors—and award them long-term contracts to make capital investments worth their while. The new openness to outside vendors is forcing the GM component divisions to improve their competitiveness in cost and quality. GM's Central Foundry, for example, is moderniz-

ing several foundries and plans to sell more castings to customers outside GM, which now accounts for 85 pct of Central Foundry's orders.

Looking Outside GM

C-P-C has begun an Organizational Competitiveness Program (OCP), which looks at the quality, cost, and timeliness of competing automakers all over the world. "We've always looked at the competition's end-products," C-P-C's Mr. Reuss told *Iron Age* in an interview last month. "Now we're comparing our whole organization with the competition's. How do our fabrication, assembly, sales, and finance units stack up versus the competition's? When I visit a C-P-C plant, I ask them how they compare with the competition and what their plan is to beat it."

The most obvious sign of GM's new openness to outside technology is its growing number of joint ventures and acquisitions of outside firms. Leading examples are GM's $5 billion purchase of Hughes Aircraft and $2.5 billion buy of Electronic Data Systems (EDS). The No. 1 automaker also has 50/50 joint ventures with Toyota in New United Motor Manufacturing, Inc., (NUMMI) and with Fanuc in GMF Robotics. Besides this impressive array, GM has minority stakes in several machine-vision and artificial-intelligence companies—and also in Japanese vehicle companies Isuzu and Suzuki.

Forging links between GM and these companies is no easy matter. The small machine-vision companies, for example, have been overwhelmed by hordes of visitors from GM eager to learn all about vision technology. Even NUMMI has felt the need to restrict the flow of visitors from GM. The danger is that a giant like GM can wring all the entrepreneurial, innovative juices out of the smaller firms.

EDS presented another problem. The Dallas-based computer company has a dynamic corporate culture largely modeled on its hard-driving founder and chairman, H. Ross Perot. Mr. Perot gained renown by organizing missions to rescue soldiers missing in action in Southeast Asia and EDS employees stuck in Iran when Ayatollah Khomeini took over. Some GM employees transferred to EDS resent the gung-ho, we're-the-best *esprit de corps* at EDS. More tangibly, the EDS benefits aren't as good as those at GM.

But EDS has a certified entrepreneurial spirit, and GM Chairman Roger B. Smith has given EDS the job of linking GM operations so that paper becomes obsolete at GM. The problem is: EDS people know next to nothing about carmaking. Fusing EDS and GM will require a lot of plain talking and explaining.

The problems of merging EDS and GM are rivaled by the confusion of reorganizing GM itself into the two car groups. "A lot of people at GM hardly even know who their boss is," one supplier told *Iron Age*. "They don't know if or where they'll be moved. GM is in such a state of flux right now that it's hard to get decisions out of some of their people." Sometimes even finding GM employees' phone numbers is difficult, particularly on days when the reorganizing corporation assigns them new phone numbers or offices or even buildings.

GM's Visionaries

The men behind this massive reorganization and cultural revolution are GM Chairman Smith and President McDonald, two down-to-earth, plain-spoken Midwesterners who spurn pretentious talk about how they're making history.

"We need a whole new way of coming at the car," Mr. Smith told the press in 1982. The next year he told *Iron Age*: "We've got to have a new way, but I don't know how it's going to turn out. I'm not an engineer. There may be some squeeze-it-out-of-the-toothpaste-tube design."

In such straightforward talk Mr. Smith outlines his mind-blowing ideas about forgetting everything we know and sitting down before a clean sheet of paper with an open mind. The GM chairman's great strength is that he's willing to risk billions on the ingenuity of GM employees—even though he doesn't know how it will turn out. Mr. Smith has the kind of inspiring naivete

At the helms of the Big Three are (top) GM's Chairman Roger Smith and President F. James McDonald with the prototype Saturn car; Ford President Harold Poling and Chairman Donald Petersen (center); and (bottom) outspoken Chrysler Chairman Lee Iacocca.

that enables him to say: Why not? to things never thought of before.

Mr. Smith put his clean-sheet small car in a separate corporation, Saturn, for some tangible and intangible reasons. Separate from GM, Saturn Corp. won a better labor contract from the United Autoworkers than did the rest of GM. Saturn also is spared the expense of sharing GM's corporate overhead.

But less tangibly, Saturn was set up as a separate corporation to encourage a more innovative corporate culture than at GM. For Saturn's president, GM executives chose Joseph J. Sanchez, "a man who didn't have GM stamped all over him," as Dr. Eugene E. Jennings, professor of management at Michigan State University, put it. Mr. Sanchez was a Latin-American born in New York City who spent most of his GM career in South America. But he died last January, two weeks after his appointment as Saturn president.

His replacement, William E. Hoglund, was the Pontiac general manager who encouraged Pontiac engineers to develop the innovative plastic-bodied Fiero sports car. The development of the Fiero is a good example of where GM wants to go. Mr. Hoglund gave a team of engineers the freedom to come up with something new. Saturn is a $5 billion version of that approach.

An entrepreneurial corporate culture also is necessary for GM to accomplish its longterm strategy of diversifying into more nonautomotive businesses. " 'To be the world's leader in all technologies appropriate to us'—that is GM's stated goal in the worldwide technology race," states the first sentence of GM's 1984 annual report. In defense, electronics, financial services, robotics, machine vision, and artificial intelligence, GM wants to come up with the most efficient manufacturing techniques. General Motors will become a General Manufacturing with perhaps a third or more of its sales coming from products besides vehicles by the year 2000.

These visions are attractive enough. "But Roger Smith is taking one big risk," points out Dr. Jennings, "because General Motors has not proved in the past ten years that it is an efficient producer of top-quality, reliable automobiles. If GM is trying to do too much too fast, that will hinder it from becoming competitive with the Japanese."

The plastic-bodied Fiero (top) gave Pontiac a new identity and GM a shot in the arm. Ford pioneered aerodynamic styling in its Tempo/Topaz and now (center) Taurus/Sable models. Chrysler's K-cars, like the Plymouth Reliant (bottom), saved the corporation.

Eighteen Meetings

One great advantage of GM's big size is that every new product doesn't have to be an instant success. The company's J cars, such as the Chevrolet Cavalier, sold poorly when they were introduced in spring 1982. But the corporation stuck with the cars and modified them. Now the Cavalier is the top-selling car in the U.S.

The problem with the J cars was that GM conceived them in the late 1970s, when fuel economy was consumers' top concern. By spring 1982, however, gasoline prices had stabilized and consumers were as interested in performance as in gas mileage. Customers thought the J cars had too many costly accessories as standard equipment and not enough horsepower.

"GM is a very slow and steady corporation," commented one metalproducing executive who supplies the Big 3. "It moves purposefully. Other automakers—Chrysler especially—gyrate wildly. When Chrysler has problems, it pounces on new solutions."

Another supplier, in a materials-management company, spoke with some irritation about GM's purposefulness. "GM decides on its material-handling system four or five years before beginning production," the executive said. "A snowball develops that can't be stopped."

GM, he added, orders equipment so far in advance that even when better equipment comes along it sticks with the original order.

"GM is still burdened with an enormous internal structure that has to be streamlined," said Mr. Cole.

The No. 1 automaker, Mr. Reuss explained, is taking a "pro-active approach" to reducing its workforce, mainly through attrition and early retirements. "For today's capacity and sales," said Mr. Reuss, "we've got to have fewer people."

Prime candidates for early retirement are GM employees who subscribe to the old way of doing business. "There are still some employees at GM who think we can't learn anything from the Japanese," said Alex C. Mair, GM vice president and group executive of technical staffs. "We need to identify these people and phase them out."

The same goes for managers who resist GM's participatory-management approach, Quality of Work Life (QWL). "There is no place at GM for the executive who calls a meeting and says, 'Hey, guys, we're going to start quality circles on Monday, and you better have results by Friday or you're in trouble,' " explained Mr. Cole.

To drive the point home, GM has reduced or eliminated standard cost-of-living wage increases to many sal-

aried employees. Instead, GM is using that money to award merit increases based on quality and return on investment.

The saying in the auto industry is: "It takes 18 meetings at GM to get a decision out of GM; nine at Ford; and four at Chrysler." Those figures certainly aren't exact, but the point is correct: GM is the slowest-moving of the Big 3, Chrysler the fastest, and Ford somewhere in between.

The good thing about a company as big as GM, Mr. Cole points out, is that it can nurture ideas that take time to develop. In smaller companies, new ideas can get shot down before they have time to grow.

The bad thing about GM's size is that good ideas, however well nurtured, can also get lost between the cracks. One of the most common complaints from advanced manufacturing engineers at GM's Technical Center is that they can't get GM manufacturers to use their ideas. Mr. Cole tells of driving a GM mini van "that was almost the spitting image of the Chrysler product—and GM had it 12 years ago. They just didn't feel it was quite the right time to introduce it." Chrysler introduced its Caravan/Voyager mini vans in fall 1983—and had a smashing success. Only in 1985 did GM finally come out with its Chevrolet Astro mini van.

Fear of Dying

Chrysler's corporate culture remains driven by the memory of its brush with bankruptcy and death. That is a great advantage to Chrysler: Its managers often speak of the camaraderie developed during months of "living in the trenches together," as Chrysler Motors Chairman Gerald Greenwald puts it.

"Chrysler must maneuver skillfully to be first in getting its products to the market," said an executive at a plastics company that supplies Chrysler. "That means they must be skilled at listening to what the market wants."

Chrysler must not only be first with each new product—but also must make sure that each new product is a resounding success. "We have to hit a home run every time we're up," said Chrysler Motors President Harold K. Sperlich. "Others can hit singles and doubles and still stay alive."

So far Chrysler's managers have been hitting consistently well. The front-drive Aries/Reliant K car pulled the company through the gloomy days of near-bankruptcy in 1980-81. The mini vans introduced in 1983 were a big success. So were Chrysler's convertibles and turbocharged engines. None of these technologies was new. But Chrysler was the first U.S. automaker to see a market for them. "Of the Big 3, Chrysler is best at seizing opportunities," said C.K. Prahalad, business professor at the University of Michigan. "In contrast, GM focuses on strategic planning."

Chrysler maneuvers faster than GM or Ford. GM takes years to build a new plant. Chrysler simply guts existing facilities: It can't afford the spanking new $500 million assembly plants that GM builds. Once Chrysler decided to build mini vans at its Windsor, Ont., plant, it shut down the plant and converted it to mini-van production in a breathtaking four months.

"You can't say Chrysler is a culture in transition," said Dr. Jennings. "It's a culture in the making. The winds of crisis erased the imprints of the executives before Mr. Iacocca."

The personality of Chrysler Chairman Lee A. Iacocca pervades Chrysler more than those of the Big 2 chairmen do their companies. Chrysler employees are grateful to him for saving their company. Many hang his picture on their office walls.

"Lee is a tremendous hands-on manager," said Dr. Jennings. "He's great at identifying a market niche and plugging it with a well-designed car. And he's a marvelous salesman.

"But he's not a visionary. His temperament is much better suited to rescuing Chrysler than to building a future for the company."

On the other hand, Dr. Jennings points out, it may be impossible for a Chrysler executive to sit back and dream up a future Chrysler the way Roger Smith is doing at GM. Chrysler simply doesn't offer its leaders the security that GM offers Mr. Smith, a security that greatly aids creative planning.

Some analysts doubt that Chrysler can remain an integrated carbuilder over the long term. The company already buys 70 pct of its parts

BIG THREE'S WORLDWIDE SALES

Total Vehicle Sales (millions of units)

	General Motors	Ford	Chrysler
U.S. and Canada	6,502	3,318	1,966
Rest of World	1,754	2,349	68
Total	8,256	5,667	2,034

Total Sales ($ billions)

	General Motors	Ford	Chrysler
Automotive	81	48	20
Nonautomotive	3	4	—
Total	84	52	20

Source: Annual reports. All figures are for 1984. Vehicle sales include cars, trucks, buses, and tractors.

from outside suppliers; GM buys 35 pct from outside. "Chrysler could easily stop manufacturing engines and move toward becoming just an auto assembler," said one.

The No. 3 automaker must respond quickly. Chrysler executives, for example, vigorously opposed the end of the voluntary restraint agreement (VRA) limiting Japanese imports. They also took legal action against GM and Toyota's joint venture, NUMMI. But once the VRA was dropped, Chrysler immediately announced plans to import even more Japanese cars from Mitsubishi and to form its own joint venture with Mitsubishi.

"We had Plan A and Plan B," said Mr. Sperlich. "With the end of the VRA, we went with Plan B as fast as we could."

Of the Big 3, Chrysler has by far the fewest layers of management. Suppliers have to deal with far fewer people at Chrysler than at GM or Ford, and they're more likely to become personally acquainted with the Chrysler people. Suppliers to Chrysler even find themselves invited to meetings at which such higher-ups as Mr. Sperlich speak. That would be quite unusual at GM.

GM Group Executive Lloyd Reuss is overseeing the reorganization of GM at the Chevrolet-Pontiac-Canada (C-P-C) group.

People at Ford

All the Big 3 now are putting tremendous emphasis on tapping their employees' brainpower through participatory management. This is a big change from the past at Ford.

"For a long time Ford has been dominated by personalities at the top of its corporate structure," said Dr. Jennings. Starting with founder Henry Ford and continuing through his grandson Henry Ford II, Ford chairmen have kept most of the company's power in the hands of their corporate staff.

"Ford Motor was a fiefdom under Henry Ford II," said Mr. Cole. "Everybody on the corporate staff had a tremendous fear of not doing things the way Henry liked them. That was one reason that Henry Ford II eventually removed himself." He now sits on Ford's board of directors.

On the other hand, "the typical Ford employee has a certain pride in being associated with a company founded by a family as impressive as the Fords," points out John B. Stewart, Ford's manager of education and personnel research. Henry Ford was the Great Man of the auto industry's founding fathers. Though the Ford family has taken a lower profile in Ford Motor's affairs, the family's aura has engendered mostly good will in company employees.

Ford's present top managers, Chairman Donald E. Petersen and President Harold A. Poling, are deeply committed to the team approach to management. As president, Mr. Petersen one day was touring the Ford design studios and happened to ask the designers whether they liked the designs they were working on. No, they said. They felt they were designing cars to look the way somebody else wanted them to look, not the way they'd like.

Design cars the way you'd like them to look, Mr. Petersen told them. The result was aerodynamic styling whose rounded corners distinguish Ford's Tempo/Topaz, Thunderbird/Cougar, and now Taurus/Sable. Just as important, the aero look has given Ford employees a sense of identity, something tangible they can point to that sets their company apart.

Ford management also believes that "technology alone isn't the answer," as Mr. Poling puts it. "Car-building starts with the people and the process," he says. "Then you look at the technology." Ford is slower than GM to rush out and buy the latest unmanned whizbang.

Mr. Petersen proudly calls himself a disciple of W. Edwards Deming, the originator of statistical process control (SPC). The Ford chairman has lionized the 85-year-old statistician in a videotape widely circulated throughout Ford. Mr. Deming is a frequent visitor to Ford.

"We have improved our union and employee relations substantially," states the 1984 Ford annual report, "and have, we believe, the best such relationships in the domestic industry."

That boast probably is true. Ford has avoided a general workers' strike since 1977. GM workers struck in September 1984; Chrysler workers struck briefly last October.

In 1982 Ford devised an innovative labor contract that gave workers greater job security in exchange for modest pay hikes. GM patterned its contract that year on Ford's.

"There's a lot more mutuality in goal setting at Ford," explained Mr. Stewart. "Ford traditionally managed by objectives, but those objectives usually were set by managers."

The company still is burdened by too many levels of management. It has 384,000 total employees now but plans to cut the salaried ranks by 20 pct by 1990.

Throughout the Big 3, the tasks of reorganizing, cutting the workforce, and streamlining the corporate culture can disrupt many work days of many employees. But most support the changes.

At the Big 3, "there is a general satisfaction among employees with their top leadership," said Mr. Cole. "This is unusual. Several years ago, there was very open criticism of top management at all the companies. Today there's a rather high level of *esprit de corps* at all three companies. That's a very good sign." □

PRICE & PRODUCTION DATA

(Effective December 30, 1985)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	157	158	173	120
Pittsburgh	149	177	209	115
Youngstown	81	80	96	62
Lake Erie	107	111	130	94
Detroit	129	135	144	133
Chicago	454	425	497	344
Cincinnati	66	86	83	77
St. Louis	65	58	71	48
Southern	166	193	213	131
Western	67	69	81	61
U.S. Production	1,441	1,492	1,697	1,185

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural) ..... gross-ton 58.0*
Pellets (per iron unit natural) ..... gross-ton 59.4**
Pellets (per iron unit natural) ..... gross-ton 72.5-86.9***
Mesabi, regular-unscreened ..... gross-ton $32.53
Mesabi, non-bessemer ..... gross-ton $30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Pickands Mather, 8/1/85, delivered hold of vessel, upper Lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82; Hanna Mining and Cleveland-Cliffs, 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective December 30, 1985)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1985	To Date 1984
Net tons, in thousands	1,441	1,492	86,711	89,888
Capability Utilization Rate	56.6	58.6	65.4	67.0

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 7/1/84)	27.582	27.582	27.582	27.582
Pig Iron** (Net ton = 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton = 2240 lbs.)	$ 72.17	$ 70.50	$ 68.83	$ 80.17
No. 2 bundles	$ 51.17	$ 50.50	$ 50.50	$ 51.50

Scrap Comparison (Gross Ton)

No. 1 steel, Pittsburgh	$ 72.50	$ 72.50	$ 69.50	$ 83.50
No. 1 steel, Philadelphia	71.50	69.50	67.50	76.50
No. 1 steel, Chicago	72.50	69.50	69.50	80.50
No. 1 bundles, Detroit	67.50	66.50	59.50	70.50
Low Phos., Youngstown	71.50	69.50	66.50	72.50
No. 1 mach'y cast., Pgh	68.50	68.50	68.50	66.50
No. 1 mach'y cast., Phila	91.50	91.50	91.50	98.50
No. 1 mach'y cast., Chi	104.50	97.50	97.50	110.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.
**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective December 30, 1985) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	48.60	49.53	12/30/85
Copper (C)	66.50-69.00	66.00-69.00	12/27/85
Lead	18.50-19.50	18.25-19.50	12/16/85
Magnesium Ingot	153.00	148.00	12/ 9/85
Nickel (LME)	183.38	195.46	12/30/85
Zinc	35.00	38.00	11/ 6/85

ALUMINUM: Avg. for last week & previous week. COPPER (C) = cathode. LEAD: common grade. MAGNESIUM: 99.8% pig, delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$236.00
Beryllium-copper, per lb. cont. Be	$144.00
Beryllium 97% powder 200	$197.00
Cadmium, ton lots	$1.25-1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$11.70
Gold per troy oz.	$327.05
Indium, dollars per troy oz.	$2.50
Iridium, dollars per troy oz.	$430.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb. f.o.b. N.Y.	$320.00-330.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.00-3.13
Nickel electro (PDCR)	$3.29
Palladium, per troy oz.	$95.50
Platinum, per troy oz.	$340.00
Rhodium, per troy oz.	$1,125.00
Silver ingots, per troy oz.	$5.865
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red.	$9.00-9.50
Vanadium	$6.00
Zirconium sponge	$12.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

Dec. 23—TRADING
Dec. 24—SUSPENDED
Dec. 25—
Dec. 26—
Dec. 27—

Scrap Prices
Brass Mill Scrap

(Cents per lb.; over 20,000 lbs. add 1¢ per lb)

	Solids	Turnings
Copper	61	52
Yellow brass	51¾	45¼
Red brass	56⅛	48¾
Comm. bronze	57¾	49¾
*Aang. bronze	43	42
Free cutting rod ends	47	46

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	58
No. 2 copper wire	50
Light copper	41

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	54
No. 2 copper wire	46
Light copper	37
No. 1 composition	47
No. 1 comp. turnings	46
Hvy. yellow brass solids	30
Hvy. yellow brass turnings	27
Radiators	36

Aluminum		
New mixed clips	33	— 34
Old sheet	30	— 31
Old cast	30	— 31
Clean dry borings	31	— 32

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	24	— 26
Mixed I.C. clips	21	— 22
Old sheets and cast	20	— 21
Borings and turnings	16	— 18
Duraluminum clippings	24	— 25

Copper and Brass

No. 1 copper wire	45	— 46
No. 2 copper wire	37	— 39
Light copper	32	— 33
Radiators	30	— 31
No. 1 composition	39	— 40
No. 1 composition turnings	36	— 37
Cocks and faucets	28	— 29
Clean heavy yellow brass	27	— 28
Brass Pipe	28	— 29
New soft brass clippings	39	— 40

Lead

Heavy soft lead	5	— 7
Whole batteries	1	— 3
Type metal	15	— 17
Electrotype	13	— 15

Nickel

Nickel solids	110	—120
Nickel rod ends	110	—120
Nickel sheets, clips	110	—120
Nickel turnings	25	— 35

Zinc

New zinc clippings	15	— 17
Old diecast zinc	11	— 13

St. Louis price reporting change

Effective Jan. 6, *Iron Age* will revise scrap prices reported for the St. Louis market to align its prices with those paid by the consumers in that region. For some of the grades in that market, the actual market prices may not change as much as the *Iron Age* prices will.

For additional information, contact Michael Marley, Managing Editor, Iron Age, Chilton Co., Chilton Way, Radnor, Pa. 19089.

EFFECTIVE DECEMBER 30,1985

(Effective December 30,1985) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of *Iron Age* editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	63.00
No. 1 dealer bundles	90.00 to	91.00
No. 1 factory bundles (auto)	90.00 to	91.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	88.00 to	89.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	43.00 to	44.00
Cast iron borings	42.00 to	43.00
Low phos. punchings plate	97.00 to	98.00
Heavy turnings	63.00 to	64.00
No. 1 RR hvy. melting	79.00 to	80.00
Rails, 2 ft. and under	102.00 to	103.00
Scrap rails, random lgth	76.00 to	77.00
RR specialties	95.00 to	96.00
No. 1 machinery cast	68.00 to	69.00
Cupola cast	61.00 to	62.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	515.00 to	525.00
18-8 turnings	415.00 to	425.00

Chicago

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	65.00 to	66.00
No. 1 dealer bundles	90.00 to	91.00
No. 1 factory bundles (auto)	91.00 to	92.00
No. 2 dealer bundles	58.00 to	59.00
No. 1 busheling	84.00 to	85.00
Shredder scrap	85.00 to	86.00
Machine shop turnings	38.00 to	39.00
Mixed borings and turnings	40.00 to	41.00
Shoveling turnings	42.00 to	43.00
Cast iron borings	45.00 to	46.00
Low phos. forge crop	97.00 to	98.00
Low phos. punchings plate 1/4 in. and heavier	112.00 to	113.00
Low phos. 2 ft. and under	107.00 to	108.00
No. 1 RR hvy. melting	84.00 to	85.00
Scrap rails random lgth	82.00 to	83.00
Reroller rails	105.00 to	106.00
Rails, 2 ft. and under	103.00 to	104.00
RR couplers and knuckles	90.00 to	91.00
RR car axles	103.00 to	104.00
No. 1 machinery cast	104.00 to	105.00
Cupola cast	90.00 to	91.00
Stove plate	92.00 to	93.00
Steel car wheels	90.00 to	91.00
Stainless		
18-8 bundles and solids	500.00 to	510.00
18-8 turnings	415.00 to	425.00
430 bundles and solids	130.00 to	135.00
430 turnings	95.00 to	100.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	83.00 to	86.00
No. 2 dealer bundles	44.00 to	47.00
No. 1 busheling	82.00 to	85.00
Shredder scrap	82.00 to	85.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	73.00 to	76.00
Low phos. 2 ft. punchings	94.00 to	97.00
Electric furnace bundles	88.00 to	91.00
RR specialties	73.00 to	76.00
Rails, 2 ft. and under	98.00 to	101.00
Cupola cast	78.00 to	81.00
Heavy breakable cast	53.00 to	56.00
No. 1 machinery cast	90.00 to	93.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 52.00 to	$ 53.00
No. 2 hvy. melting	49.00 to	50.00
No. 1 dealer bundles	67.00 to	68.00
No. 2 bundles	25.00 to	26.00
No. 1 busheling	66.00 to	67.00
Drop forge flashings	40.00 to	41.00
Machine shop turnings	31.00 to	32.00
Mixed borings and turnings	12.00 to	13.00
Shoveling turnings	31.00 to	32.00
Cast iron borings	17.00 to	18.00
Heavy breakable cast	33.00 to	34.00
Mixed cupola cast	48.00 to	49.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	345.00 to	355.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 60.00 to	$ 61.00
No. 2 hvy. melting	55.00 to	56.00
No. 1 dealer bundles	74.00 to	75.00
No. 2 dealer bundles	36.00 to	37.00
Machine shop turnings	22.00 to	23.00
Shoveling turnings	22.00 to	23.00
Low phos. plate	71.00 to	72.00
Electric furnace bundles	61.00 to	62.00
Galvanized bundles	59.00 to	60.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 58.00 to	$ 59.00
No. 2 hvy. melting	54.00 to	55.00
No. 1 dealer bundles	79.00 to	80.00
No. 1 factory bundles	59.00 to	60.00
No. 2 bundles	35.00 to	36.00
No. 1 busheling	69.00 to	70.00
Machine shop turnings	24.00 to	25.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	17.00 to	18.00
Cut structural & plates, 5 ft. and under	68.00 to	69.00
Cut structural & plates, 2 ft. and under	86.00 to	87.00
Low phos. punchings plate	86.00 to	87.00
Foundry steel, 2 ft. & under	53.00 to	54.00
No. 1 RR hvy. melting	58.00 to	59.00
Rails, 2 ft. and under	87.00 to	88.00
Rails, 18 in. and under	89.00 to	90.00
No. 1 machinery cast	77.00 to	78.00
Mixed cast	44.00 to	45.00
Stainless		
18-8 bundles	445.00 to	455.00
18-8 turnings	330.00 to	340.00
430 bundles	100.00 to	110.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 52.00 to	$ 53.00
No. 2 hvy. melting	42.00 to	43.00
No. 1 busheling	67.00 to	68.00
No. 1 dealer bundles	67.00 to	68.00
No. 2 bundles	29.00 to	30.00
Machine shop turnings	15.00 to	16.00
Mixed boring and turnings	15.00 to	16.00
Shoveling turnings	21.00 to	22.00
Cast iron borings	23.00 to	24.00
Low phos. plate	74.00 to	75.00
Structural and plate, 2 ft. and under	79.00 to	80.00
Rails, 2 ft. and under	79.00 to	80.00
Scrap rails, random lgth	64.00 to	65.00
No. 1 machinery cast	79.00 to	80.00
No. 1 cupola cast	60.00 to	61.00

St. Louis

No. 1 hvy. melting	$ 49.00 to	$ 50.00
No. 2 hvy. melting	36.00 to	37.00
Foundry steel, 2 ft.	43.00 to	44.00
No. 1 dealer bundles	49.00 to	50.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	21.00 to	22.00
Cast iron borings	30.00 to	31.00
No. 1 RR hvy. melting	53.00 to	54.00
Rails, random length	59.00 to	60.00
Rails, 18 in. and under	72.00 to	73.00
RR specialties	70.00 to	71.00
Cupola cast	71.00 to	72.00
Heavy breakable cast	49.00 to	50.00
Stove plate	89.00 to	90.00
Steel car wheels	81.00 to	82.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	64.00 to	65.00

Birmingham

No. 1 hvy. melting	$ 68.00 to	$ 69.00
No. 2 hvy. melting	64.00 to	65.00
No. 1 dealer bundles	68.00 to	69.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	68.00 to	69.00
Shredder scrap	84.00 to	85.00
Machine shop turnings	24.00 to	25.00
Shoveling turnings	38.00 to	39.00
Cast iron borings	37.00 to	38.00
Electric furnace bundles	64.00 to	65.00
Elec. furnace, 3 ft. & under	64.00 to	65.00
Structural and plate, 2 ft.	86.00 to	87.00
Structural and plate, 4 ft.	81.00 to	82.00
No. 1 RR hvy. melting	81.00 to	82.00
Scrap rails, random lgth	69.00 to	70.00
Rails, 2 ft. and under	85.00 to	86.00
Angles and splice bars	81.00 to	82.00
No. 1 cupola cast	84.00 to	85.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	64.00 to	65.00
No. 2 bundles	34.00 to	35.00
Machine shop turnings	7.00 to	8.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	15.00 to	16.00
Low phos. 18 in. and under	79.00 to	80.00
Rails, random length	59.00 to	60.00
Rails, 2 ft. and under	74.00 to	75.00
No. 1 cupola cast	59.00 to	60.00
Heavy breakable cast	24.00 to	25.00
Drop broken cast	71.00 to	72.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 44.00 to	$ 45.00
No. 2 hvy. melting	35.00 to	36.00
No. 2 dealer bundles	20.00 to	24.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	445.00 to	465.00
18-8 turnings	340.00 to	365.00
430 prepared solids	90.00 to	100.00
410 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 51.00 to	$ 53.00
No. 2 hvy. melting	41.00 to	43.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	34.00 to	36.00
No. 1 busheling	59.00 to	61.00
Shredder scrap	61.00 to	63.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	75.00 to	80.00
Mixed cupola cast	46.00 to	48.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	32.00 to	34.00
No. 1 dealer bundles	29.00 to	31.00
No. 2 dealer bundles	17.00 to	19.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	32.00 to	34.00
No. 1 dealer bundles	29.00 to	31.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	70.00 to	72.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	60.00 to	62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 81.00
No. 2 hvy. melting, cut 2 ft. and under	70.00
No. 1 dealer bundles	86.00
No. 2 bundles	61.00
Mixed steel scrap	59.00
Bush. new fact. prep'd	81.00
Bush. new fact. unprep'd	64.00
Machine shop turnings	34.00
Short steel turnings	34.00
Mixed borings and turnings	19.00
Cast scrap	89.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 67.00 to	$ 68.00
No. 2 hvy. melting	54.00 to	55.00
No. 2 bundles	40.00 to	41.00
Machine shop turnings	11.00 to	12.00
Crushed turnings	30.00 to	31.00
Shredder scrap	74.00 to	75.00
Cut structural plate, 2 ft. and under	97.00 to	98.00
Cut structural plate, 5 ft. and under	79.00 to	80.00
Unstripped motor blocks	57.00 to	58.00
Cupola cast	83.00 to	84.00

COOLED PRICES COULD LAST THROUGH 1986

If U.S. industry is not buying at a hot pace these days, it is certainly not high and rising prices that are to blame. Prices of finished goods at the producer level rose only 1.5 pct between November of 1984 and the same month last year—the latest month of complete price data.

The soft price situation is reflected in the table here listing 22 key metalworking product lines. In November, prices for seven product lines actually decreased from October. Four showed no price changes at all, and six had price increases of only 0.1 pct. In other words, some 17 out of 22 product lines showed little or no month-to-month price pressures in November.

In the two-month period of October and November, overall finished goods prices rose more sharply than in any similar period over the past near-three years. In October, these prices rose by 0.9 pct, and in November, they rose by 0.8 pct. However, U.S. Labor Dept. analysts pointed out that these jumps were due entirely to sharp rises in prices of energy goods and foods. Energy prices rose by 3.1 pct in November; food prices by 1.6 pct—a pace not expected to continue.

A number of economists are now predicting an even softer price scenario for this year compared to 1985. One economist, Pierre Rinfret noted that, "OPEC's decision to meet the price cuts of non-OPEC oil producers means further declines in both interest rates and inflation in 1986."

The record shows that since 1981, the declining price of oil has gone hand-in-hand with declines in inflation and interest rates.

Clearly, it can be said that if ever there was peace on the price front it is right now. And it looks like there will be more of the same through most, or all, of this year.

Latest Month Covered: November 1985

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	396.0	+ 0.1	+ 0.6
Metal Forming Machine Tools	433.2	0	+ 1.4
Agricultural Machinery & Equip.	337.8	+ 0.1	+ 0.2
Construction Machinery & Equip.	363.5	+ 0.1	+ 1.6
Industrial Process Furnace & Ovens	392.2	+ 0.8	+ 3.3
Industrial Material Handling Equip.	294.6	+ 0.1	+ 1.1
Pumps, Compressors & Allied Equip.	359.5	+ 0.3	+ 1.8
Fluid Power Equip. (Dec. 1970 = 100)	265.4	+ 0.2	+ 1.5
Mechanical Power Transmission Equip.	339.0	— 0.4	+ 2.6
Automobiles	234.6	— 0.1	+ 4.5
Motor Trucks—Light	312.6	+ 0.1	+ 7.5
Motor Trucks—Heavy	335.1	— 0.7	+ 1.1
Railroad Equipment	364.1	— 0.1	+ 1.4
Fabricated Metal Structural Products	315.4	0	+ 0.9
Electric Motors	351.1	— 0.2	+ 2.6
Valves & Fittings (Dec. 1982 = 100)	105.1	+ 0.3	+ 2.2
Ball & Roller Bearings	354.3	— 0.2	+ 2.8
Cutting Tools & Accessories	287.2	0	+ 1.6
Heating Equipment	261.3	— 0.1	+ 2.1
Plumbing Fixtures & Brass Fittings	315.0	+ 0.1	+ 1.9
Metal Containers	358.3	+ 0.2	+ 0.3
Miscellaneous Metal Products	302.4	0	+ 0.3

Data based on U.S. Labor Dept.'s Producer Price Index

ORDERS FOR CAPITAL GOODS LOOK SHAKY

As far as capital goods producers are concerned, October was a bummer. Their orders, including those received by both defense and nondefense goods producers, were down a thumping 11 pct from September.

Much of the October slide in orders for capital goods was due to a 25 pct decline in defense-related orders. Defense orders, of course, are volatile. They may well be up strongly when November data is known. Still, the overall machinery order picture remains lackluster.

As can be seen on the table here, many of the machinery product lines had order setbacks in October.

Notably, there has been no growth thrust in machinery lines for a long time. The U.S. Commerce Dept., in its October report on manufacturers' orders and shipments, noted that shipments of machinery "first reached the $33 billion level in June 1984 and have been relatively stable since then, averaging $33.1 billion per month." In October, shipments of machinery totaled $33.9 billion.

This underlying lack of growth push has led to tight reins being held on inventories. Stocks held by durable goods manufacturers in October declined by $1.5 billion, or 0.8 pct from September. The government report noted, "Every major industry except instruments and lumber decreased."

Further, the decline in stocks occurred in all three stages of fabrication—purchased goods, work in process and finished goods.

Total shipments of durable goods producers have been holding up well. That helps. After all, it is shipments that are invoiced. Shipments of durable goods were up $3.2 billion, or 3.1 pct, in October.

Still, orders shape tomorrow's business and orders during the month fell by $2.2 billion or 1.1 pct.

Billions of Dollars, Seasonally adjusted Monthly Total, unless otherwise noted Source: U.S. Dept of Commerce		Latest Month or Qtr.	Previous Month or Qtr.	Same Period Year Ago
CAPITAL EXPENDITURES (Annual Rates)				
U.S. Industry, Total	4th Qtr*	$387.4	$389.5	$368.3
Manufacturing, Total	4th Qtr*	156.0	157.8	147.0
Manufacturing, Durable Goods	4th Qtr*	74.7	75.8	71.4
Mining Industry	4th Qtr*	15.8	16.3	17.0
KEY INDICATORS, Durable Goods Manufacturing				
New Orders	Oct.	104.4	106.6	96.5
Shipments	Oct.	106.9	103.7	100.8
Inventories	Oct.	198.4	200.1	190.1
Unfilled Orders	Oct.	354.0	356.5	346.0
NEW ORDERS, METALWORKING				
Capital Goods Producers, Nondefense Industries	Oct.	27.2	29.2	25.3
Capital Goods Producers Defense Industries	Oct.	6.0	8.1	5.2
Primary Metals, Total	Oct.	10.7	10.2	10.5
Steel (SIC 331)	Oct.	4.6	4.2	4.3
Iron & Steel Castings (SIC 332)	Oct.	1.2	1.3	1.3
Nonferrous Metals	Oct.	4.9	4.7	4.9
Nonelectrical Mach.-Equip. Industries, Total	Oct.	16.6	17.4	16.9
Engines & Turbines	Oct.	1.0	1.2	0.8
Farm Machinery & Equipment (Shipments)	Oct.	0.9	0.8	1.0
Construction, Mining & Mat. Hdlg. Equip	Oct.	2.7	2.8	2.8
General Industrial Machinery	Oct.	1.2	1.5	1.4
Fluid Power Equipment** (Index-1972=100)	Oct.	288.0	265.0	304.0
Metalworking Machinery	Oct.	1.0	1.0	0.8
Machine Tools, Total ($Mill., Unadjusted)***	Oct.	231.6	174.1	283.6
Machine Tools, Metalcutting***	Oct.	158.3	124.1	191.8
Machine Tools, Metalforming***	Oct.	73.3	50.0	91.8
Electrical Mach. & Equip. Industries, Total	Oct.	15.9	16.9	14.9
Elec. Transmission Equip. & Ind. Apparatus	Oct.	2.2	2.0	2.1
Household Appliances	Oct.	1.5	1.5	1.4
Communication Equipment	Oct.	5.4	6.8	5.0
Transportation Equipment, Total	Oct.	26.3	28.1	22.2
Motor Vehicles & Parts (Shipments)	Oct.	17.7	17.3	16.2
Aircraft, Missiles & Parts	Oct.	7.8	9.2	5.2
Shipbuilding & Military Tanks	Oct.	0.3	0.9	0.5
Fabricated Metal Products, Total	Oct.	14.8	14.4	12.3
Instruments, Total	Oct.	4.6	4.6	4.5

*Est.—Commerce Dept; **Source: National Fluid Power Assn.; ***Source: NMTBA.